

REMARKS

After entry of this Amendment and Response, claims 1–24 and 26–78 will be pending. Claims 1 and 38 have been amended to clarify the composition of the particulate material, claims 6, 7, 39, 44, and 49 have been amended to clarify the scope of the claims, and new claim 78 has been added. Support for the amendments and the new claim may be found, for example, in the previously filed claims. No new matter has been added.

Telephone conference with Examiner

The undersigned attorney thanks the Examiner for the telephonic interviews that took place on February 9, 2006, and February 28, 2006. The undersigned attorney is appreciative of the Examiner's suggestion that an affidavit by an inventor could constitute acceptable evidence for support of the Applicants' characterization of cited prior art in the Response filed September 29, 2005. The following comments are consistent with the discussions during the interviews and are meant to reflect Applicants' summary of the interviews.

Rejections Under 35 U.S.C. § 112

Claims 1–24 and 26–49 are rejected under 35 U.S.C. § 112, first paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner states that the specification does not support the phrase “a filler comprising plaster,” as recited in independent claim 1. Applicants respectfully disagree. On page 5, lines 30-31 of the specification, the following statement is made:

The present invention relates to a 3DP™ material system comprising a mixture of an aqueous fluid and a particulate material that includes plaster.

Thus, the disclosed particulate material must include plaster. Moreover, originally filed claim 25 recited that “the filler is plaster.” Further, a single filler or a combination of fillers may be used, such that the particulate material include fillers in addition to the requisite plaster. See page 7,

line 24 – page 8, line 1. The feature “a filler comprising plaster” is, therefore, supported by the originally filed application.

Regarding claims 31 and 32, the Examiner has objected to amendments to claims 31 and 32, which recite that the adhesive material “comprises,” rather than “is,” a polyvinyl pyrrolidone copolymer with vinyl acetate, and that the filler “comprises,” rather than “is,” polyvinyl pyrrolidone copolymer with vinyl acetate, respectively. The Examiner asserts that these amendments are not supported by the specification as originally filed. However, the specification indicates that an adhesive or combination of adhesives may be added to the particulate material. *See* page 11, lines 13–14. and lines 30–31. Similarly, a single filler or a combination of fillers may be used. As stated above, the particulate material described in the application must include plaster. As evidenced by, e.g., original claim 25, plaster is a filler. The particulate material may also include additional fillers. *See* page 7, line 24 – page 8, line 1. Thus, the originally filed application supports the amended claim language that reads on embodiments including more than one type of adhesive material or more than one type of filler.

The Examiner objected to the amendments to claim 38 because the application as originally filed does not purportedly disclose a three dimensional printing process that comprises “allowing the portion of the first particulate material layer to solidify” and “allowing the portion of the second particulate material layer to solidify,” as recited in amended claim 38. Applicants refer the Examiner to page 13, lines 8–30. For example, the specification discloses that

[i]n the first portion 30 of the particulate material layer, a reaction is initiated between the plaster contained in the particulate material layer and the water contained in the aqueous fluid... The reaction product of the aqueous fluid and particulate material forms an essentially solid circular layer...

See page 13, lines 8–12, emphasis added. Thereafter,

... a second layer of particulate material is then applied over the first, covering both the rigid first cross-sectional portion 30, and any loose particulate material by which it is surrounded. A second application of aqueous fluid follows in the manner described above, which reacts with the plaster in the newly printed layer and with the plaster in a portion of the previous cross-section portion, as well as hardening to form a second rigid cross-sectional portion added to the first rigid cross-sectional portion of the final article.

See page 13, lines 21–27, emphasis added.

The Examiner objected to the amendment to claim 39, because the application as originally filed purportedly does not support the term “a soluble particulate adhesive material.” As noted by the Examiner, the application on page 11, line 28 describes a particulate adhesive material. In the next paragraph, page 11, lines 30–31, the specification discloses that “the adhesive... is at least partially water soluble...” This phrase clearly refers to the particulate adhesive material. Moreover, the term “adhesive” is defined as “a material that is at least slightly soluble...” See page 11, line 19. Applicants have amended claim 39 to recite an at least partially water soluble particulate adhesive material. No new matter has been added. Applicants respectfully submit that, on the basis of at least these passages in the specification, the application as originally filed supports the term “at least partially water soluble particulate adhesive material,” as recited in amended independent claim 39. Applicants have similarly amended dependent claim 44.

Regarding claim 49, the Examiner has objected to previous amendments to claim 49, which recited that the polymer fiber “comprises a material selected from the group consisting of...” Claim 49 has now been amended to recite that the polymeric fiber is a material selected from the group consisting of ..., and combinations thereof. Support for this amendment may be found in the specification on, e.g., page 8, lines 4-7 and page 22, lines 26–28. No new matter has been added. Applicants submit that, on the basis of at least these passages in the specification, the application as originally filed supports amended claim 49.

Regarding claims 6 and 7, the Examiner has objected to the recitation of “the adhesive material” for lack of antecedent basis. Applicants have amended claims 6 and 7 to recite “the particulate adhesive material.”

Rejection of claims under 35 U.S.C. § 102

Claims 1–4, 7, 23, 30, and 37–38 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,649,277 to Greul et al. (“Greul”).

Greul appears to disclose a binder that may be a wax or polymer for use in free-form manufacture of three dimensional objects. See column 4, line 42. The binder of Greul is mixed with a powder; the mixture is melted, discharged from a nozzle, and cooled to define a three

dimensional object. *See* column 3, line 64 – column 4, line 42. The powder may include, e.g., copper powder. Greul does not disclose a particulate material comprising plaster, as recited in independent claims 1 and 38 that have been amended to further clarify that the claimed particulate material comprises plaster and a particulate adhesive material.

Applicants submit that for at least this reason, amended independent claims 1 and 38 and claims dependent therefrom are patentable over the cited art.

Claims 1–5, 7–16, 20, 23–25, 30, 33–37, 39–40, 44–49, 66–67, and 72–75 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,738,921 to Andersen et al. (“Andersen”).

Andersen appears to disclose polymeric or starch-containing mixtures for forming containers by molding, reforming, or extruding such compositions. *See* abstract. The mixtures are made by first forming a gel or suspension by mixing together a binder and water. Then, fibrous materials and fillers are added to the gel or suspension. *See* column 37, lines 30–41. The gel or suspension includes at least 5% water. *See* column 24, lines 32–42. Andersen does not teach or suggest a particulate material including plaster and a particulate adhesive material, as recited in independent claims 1, 39, 66, and 72. The mixtures of Andersen are not dry and, therefore, are unsuitable for use in three dimensional printing, as also required by these claims, which employ layers of dry particulate material. Applicants note that during subsequent processing, the gel or suspension is dried to form impermeable sheets. Impermeable materials, as well as moist materials, are unsuitable for use in three dimensional printing. *See* the attached **Declaration of James Bredt, sections 6–21** as well as column 6, lines 33–38 and column 51, lines 29–31.

Applicants submit that for at least these reasons, independent claims 1, 39, 66, and 72 and claims dependent therefrom are patentable over the cited art.

Claims 1–4, 7, 9, 11–13, 23–25, 30, and 37 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,965,776 to Leppard et al. (“Leppard”).

Leppard appears to disclose various alkoxyphenyl-substituted bisacylphosphone oxides that may, e.g., be used in stereolithography. *See* abstract; column 19, line 50, column 24, line 61, and column 25, line 17. Stereolithography is a method of forming objects from a liquid photopolymer that is selectively hardened by a laser. Leppard does not teach or suggest a particulate material including plaster and particulate adhesive material, as recited in amended independent claim 1. The materials of Leppard are aqueous dispersions and other fluids that are unsuitable for use in the formation, by three dimensional printing, of articles comprised of a plurality of layers that include a reaction product of a particulate material and a fluid, as also required by claim 1. *See*, e.g., column 16, line 40-56. *See* also the attached **Declaration of James Bredt, sections 22–25**.

Applicants submit that for at least these reasons, amended independent claim 1 and claims dependent therefrom are patentable over the cited art.

Claims 1–5, 7, 23–24, 26, 29–30, 33–35, 37, and 39 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,591,563 to Suzuki et al. (“Suzuki”).

Suzuki appears to disclose photocurable resins that may be used for stereolithography. As the Examiner has stated, Suzuki does not disclose a particulate material including plaster. Thus, Suzuki does not teach or suggest a particulate material including plaster and particulate adhesive material, as recited in amended independent claims 1 and 39. The materials disclosed by Suzuki are not dry and, therefore, are unsuitable for use in the formation, by three dimensional printing, of articles comprised of a plurality of layers that include a reaction product of a particulate material and a fluid, as also required by claim 1 and 39. Moreover, there is no disclosure that the resins disclosed by Suzuki are soluble, as recited in claim 39.

Applicants submit that, for at least these reasons, amended independent claims 1 and 39 and claims dependent therefrom are patentable over the cited art.

Rejection of Claims Under 35 U.S.C. § 103

Dependent claims 68–71 are rejected as being unpatentable over Andersen in view of U.S. Patent No. 4,310,996 to Mulvey (“Mulvey”). Dependent claims 68–71 depend from independent claim 66.

The Office action states that Andersen does not teach an accelerator and relies on Mulvey to provide this feature. Mulvey appears to disclose a method for forming a gypsum foam that includes adding water and various materials individually to a slurry mixer. *See* Figure 1 and related text. Neither Andersen nor Mulvey, alone or in combination, teaches or suggests a particulate material including plaster and particulate adhesive, as recited in claim 66. The gels or suspensions of Andersen and the slurry mixture of Mulvey are not dry particulate mixtures and, therefore, are unsuitable for use in three dimensional printing, as also required by amended claim 66. *See* the attached **Declaration of James Bredt, sections 6–21**.

Applicants submit that for at least these reasons, claim 66 and claims dependent therefrom, including 68–71, are patentable over the cited art.

Claims 50–65 are rejected as being unpatentable over Andersen in view of Mulvey. The Office action states that Andersen does not teach (i) an accelerator/retarder and (ii) a three dimensional printing composition. The examiner relies on Mulvey to teach (i) an accelerator, and argues that (ii) the term “three dimensional printing composition” is recited in the preamble and does not limit the claimed invention. Applicants amended claim 50 in the Amendment and Response filed on September 29, 2005, to further clarify that the claimed particulate material is suitable for use in three dimensional printing. Applicants note that neither Andersen nor Mulvey, alone or in combination, teaches or suggests a particulate material including plaster and particulate adhesives, as recited in amended independent claim 50. Moreover, the gels or suspensions of Andersen and the slurry mixture of Mulvey are not dry and, therefore, are unsuitable for use in three dimensional printing to form an article comprised of a plurality of layers, as also required by claim 50. *See* the attached **Declaration of James Bredt, sections 6–21**.

Applicants submit that for at least these reasons, claim 50 and claims dependent therefrom are patentable over the cited art.

New claim 78

Dependent new claim 78 recites a composition range that has been deleted from independent claim 1, i.e., the filler comprises up to about 80% by weight of the particulate material. No new matter has been added; support for new claim 78 may be found, for example, in originally filed claim 1.

CONCLUSION

In light of the foregoing, Applicants respectfully submit that all claims are now in condition for allowance.

If the Examiner believes that a telephone conversation with Applicants' attorney would expedite allowance of this application, the Examiner is cordially invited to call the undersigned attorney at (617) 570-1806.

Applicants believe that no fee is due for filing of this amendment. However, if any fee is due, please charge any such fee occasioned by this paper to our Deposit Account No. 07-1700.

Respectfully submitted,

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